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Prevalence of Frailty and Related Factors Among Community-Dwelling Older Adults: A Cross-Sectional Study from Western Türkiye

Toplumda Yaşayan Yaşlılarda Kırılganlık Prevalansı ve İlişkili Faktörler: Türkiye'nin Batısından Kesitsel Bir Çalışma

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This study was prepared based on the findings of Fahriye Pala's thesis study titled "Prevalence and associated factors with frailty among community-dwelling older people in Çanakkale"(Çanakkale: Çanakkale Onsekiz Mart University; 2021).

ABSTRACT Objective: This study aimed to determine the prevalence of frailty and related factors among community-dwelling older adults. **Material and Methods:** This cross-sectional study included 400 older people aged ≥65 years living in a city center in western Türkiye. The FRAIL Scale was used to evaluate frailty, the Mini Nutritional Assessment-Short Form (MNA-SF) was used to assess nutritional status, and the Katz Activities of Daily Living (Katz ADL) Scale was used to evaluate daily life activities. Multivariate analysis was performed using SPSS software. **Results:** Of the elderly participants, 24.5% were frail, and 44.2% were pre-frail. Additionally, frailty was observed 4.3 times in those aged ≥75 years, 3.1 times in those who used 5 or more drugs, 5.7 times in those with a medium perception of health, 30.6 times in those with poor/very poor health perception, and 2.2 times in those with a history of falling in the previous year. **Conclusion:** The results of this study show that approximately one in every four older people is frail, one in every two older people is pre-frail, and various variables are associated with frailty. It may be recommended that the older adults be screened regularly for frailty by nurses in primary health care institutions.

Keywords: Frailty; prevalence; aged

ÖZET Amaç: Bu çalışmada, toplum içinde yaşayan yaşlı bireylerde kırılganlık prevalansının ve ilişkili faktörlerin belirlenmesi amaçlandı. **Gereç ve Yöntemler:** Bu kesitsel çalışmaya Türkiye'nin batısındaki bir şehir merkezinde yaşayan 65 yaş ve üstü 400 yaşlı birey dâhil edildi. Kırılganlığı değerlendirmek için FRAIL Ölçeği, beslenme durumunu değerlendirmek için Mini Nutrisyonel Değerlendirme Anketi-Kısa Formu ve günlük yaşam aktivitelerini değerlendirmek için Katz Günlük Yaşam Aktiviteleri Ölçeği kullanıldı. Çok değişkenli analiz için SPSS yazılımı kullanıldı. **Bulgular:** Yaşlı katılımcıların %24,5'i kırılgan ve %44,2'si kırılganlık öncesi dönemde idi. Ayrıca 75 yaş ve üstü kişilerde 4,3 kat, 5 ve daha fazla ilaç kullananlarda 3,1 kat, sağlık algısı orta düzeyde olanlarda 5,7 kat, sağlık algısı kötü/çok kötü olanlarda 30,6 kat ve önceki yılda düşme öyküsü olanlarda 2,2 kat daha fazla kırılganlık görüldüğü belirlendi. **Sonuç:** Bu çalışmanın sonuçları, yaklaşık olarak her dört yaşlıdan birinin kırılgan, her iki yaşlıdan birinin ise kırılganlık öncesi dönemde olduğunu ve çeşitli değişkenlerin kırılganlıkla ilişkili olduğunu gösterdi. Yaşlıların birinci basamak sağlık kuruluşlarında hemşireler tarafından kırılganlık açısından düzenli olarak taranmaları önerilebilir.

Anahtar Kelimeler: Kırılganlık; prevalans; yaşlı

The population tends to age in almost all countries.[1] This increase has brought about health problems related to old age that need to be resolved. One such problem is frailty.[2] Although frailty is a problem defined differently in various sources, it is an extremely common geriatric syndrome that causes increased susceptibility to adverse health outcomes due to decreased physiological reserves and functions in multiple organ systems.[3]

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Frailty occurs in millions of older adults worldwide. However, the global prevalence of frailty remains unclear. This is because different definitions of frailty have been used in different studies.[4] According to the results of 21 cohort studies covering 61,500 older people, 10.7% of the older adults were frail, and 41.6% were pre-frail. However, the reported prevalence varies substantially between 4.0% and 59.1%.[5] A study conducted in Türkiye reported that 10% of the older adults (14.6% of women and 5.4% of men) were frail and 45.6% were pre-frail.[6]

Frailty is recognized as an important risk factor that causes many adverse health problems, including mortality in the older adults.[7] In a study in which patients were followed for 10 years reported frailty as the most common cause of mortality, with a rate of 27.9%.[8] Frailty is also an important health problem associated with outcomes, such as decreased mobility, disability, falls, fractures, cognitive decline, depression, dementia, poor quality of life, hospitalization, loneliness, and nursing home admission.[4]

The demographic trend towards aging in the world, including in Türkiye, causes fragility to become an increasingly important problem. Health care providers, especially public health nurses are expected to encounter frail older people more frequently, as the frailty rates are predicted to increase with the number of older people.[9] Another crucial issue is that frailty is reversible when it is detected at an early stage. For this reason, it is important for nurses working with the elderly to identify frail or pre-frail elderly individuals and take appropriate precautions. In addition, studies evaluating frailty in elderly individuals living in the community are limited in Türkiye and it is thought that it is important to carry out up-to-date studies on the subject and to take preventive measures. In this study, it was aimed to determine the prevalence of frailty and related factors in the older adults.

MATERIAL AND METHODS

STUDY DESIGN AND SAMPLE

A cross-sectional study was conducted. The study population (n) consisted of 12,588 older people aged 65 and over living in the city center of Çanakkale in Türkiye. The results of the FrailTURK study (41%) conducted by Eyigor et al. were used to calculate the incidence (p) of the investigated event.[10] Using the G*Power application (Düsseldorf University, Germany), the required sample size to detect an expected event proportion of 41% with a sampling error (d) of 0.05 at a confidence level of 95% was calculated as 371 people. It used single-stage cluster sampling to identify the older adults included in the sampling. The inclusion criteria were being 65 years and older, living in Çanakkale and cognitive ability to participate. 433 older people aged 65 and over living in blocks determined by the Turkish Statistical Institute using the proportional probability method were interviewed. The study was completed with 400 older adults because 12 older adults refused to participate in the study and 11 older adults had communication problems. It took an average of 15-20 minutes to fill out the questionnaire.

DATA COLLECTION

Data were collected with a questionnaire form by the researchers through face-to-face interviews at the addresses of the older adults between November 2020 and May 2021. By reaching the addresses in the blocks determined by Turkish Statistical Institute, older people over 65 years of age were informed about the purpose of the research, and their consent was obtained. Filling out the questionnaire took approximately 20-30 min. The questionnaire's content included questions to describe the older person, FRAIL Scale, Mini Nutritional Assessment-Short Form (MNA-SF) and Katz Activities of Daily Living (Katz ADL) Scale.

Demographic Questions

The form prepared in line with the literature included questions about some demographic and health-related characteristics of the older adults.[6,10,11]

FRAIL Scale

The FRAIL Scale was used to assess frailty in the older adults. This scale was developed by Morley et al., and its validity and reliability in Türkiye were performed by Hymabaccus et al.[11,12] The FRAIL Scale includes 5 items that assess fatigue, resistance, aerobics, illness, and weight loss in the elderly. As a

result of the scoring made by assigning 0 or 1 point to each item in the scale, a total of 0 points is evaluated as vigorous (non-frail), 1-2 points as pre-frail, and >2 points as frail. The total Cronbach's alpha internal consistency coefficient belonging to the subtitles of the FRAIL Scale was 0.787.[11]

MNA-SF

The scale developed by Rubenstein et al. in 2001 and its validity and reliability in Türkiye were performed by Sarikaya et al.[13,14] The MNA-SF consists of 6 items and scores the patient's change in appetite, weight loss during the last 3 months, mobility, psychological distress or acute illness, neuropsychological problems, and body mass index. Nutritional status was classified as normal between 12-14 points, malnutrition risk between 8-11 points, and severe malnutrition between 0-7 points.

Katz ADL Scale

The Turkish validity and reliability of the Daily Living Activities index developed by Katz et al. were performed by Pehlivanoğlu et al.[15,16] The Katz ADL Scale consists of 6 functions of bathing, dressing, toileting, transferring, continence, and feeding and 3 options: dependent (1 point), semi-dependent (2 points), and independent (3 points). According to the scoring, 0-6 points were evaluated as dependent, 7-12 points as semi-dependent and 13-18 points as independent. Cronbach's alpha of the scale was 0.83.

VARIABLES

The dependent variable of the research was frailty. The independent variables were age, sex, educational status, income status, current employment status, living alone, marital status, smoking, alcohol use, physical activity, physical addiction, health perception, presence of chronic diseases, polypharmacy, sleep status, nutritional status, history of falling in the previous year, and emergency service admission and hospitalization in the last year.

DATA ANALYSIS

Data were analyzed using the SPSS for Windows 27 (version 24.0. Armonk, NY: IBM Corp.). The descriptive statistical methods (number and percentage) and chi-square analysis between frailty and independent variables were used to evaluate the data. For the multivariate analysis, possible variables identified in the univariate analysis were included in the logistic regression analysis. The significance level was set as <0.05.

ETHICAL CONSIDERATIONS

The study was approved by the Ethics Committee of Çanakkale Onsekiz Mart University (date: September 6, 2021; no: E-84026528-050.01.04-2100156478). In addition, written consent was obtained from the participants through an informed consent form describing the study. The research was carried out in accordance with the principles of the Declaration of Helsinki.

RESULTS

THE PARTICIPANTS

The mean age of the older adults participating in the study was 71.67±5.49 years, and the average monthly income was 2615.13±302.98 Turkish liras (₺). Of the older participants, 59.8% (n=239) were women, 82.3% (n=329) were married, and 82.5% (n=330) lived with their spouses. Furthermore, 41.8% (n=167) of the participants were primary school graduates, 88.8% (n=355) had children, 95.8% (n=383) were unemployed, and 53.5% (n=214) stated that their income was less than their expenses. Of the older individuals, 37% (n=148) were smokers, 29.3% (n=117) used alcohol, 27.4% walked regularly, 78% (n=312) slept regularly, and 70.2% (n=281) were satisfied with their lives.

PREVALENCE OF FRAILTY IN THE OLDER ADULTS AND ASSOCIATED FACTORS

According to the frailty scale results, 24.5% (n=98) of the older adults were frail, 44.2% (n=177) were pre-frail, and 31.5% (n=125) were healthy.

The relationship between some characteristics of the older adults and frailty is shown in Table 1. Accordingly, there was a statistically significant relationship between frailty and age, educational level, alcohol use, and life satisfaction ($p<0.05$).

The relationship between the health characteristics of the older adults and frailty is shown in Table 2.

TABLE 1: The relationship between descriptive characteristics and frailty (n=400).

	Frail		Pre-frail		No frailty			
Characteristics	**n**	**%**	**n**	**%**	**n**	**%**	χ^2	**p value**
Age								
65-74	43	15.4	126	45	111	39.6	53.001	**<0.001**
75 and older	55	45.8	51	42.5	14	11.7		
Sex								
Female	64	26.8	103	43.1	72	30.1	1.677	0.432
Male	34	21.1	74	46	53	32.9		
Marital status								
Married	78	23.7	140	42.6	111	33.7	7.451	0.114
Single	3	50	3	50	0	0		
Divorced/widowed	17	26.2	34	52.3	14	21.5		
Living with								
Spouse	79	23.9	140	42.4	111	33.7	6.048	0.196
Kids	3	37.5	3	37.5	2	25		
Alone	16	25.8	34	54.8	12	19.4		
Educational level								
No education	11	47.8	9	39.2	3	13	17.073	**0.009**
Primary school graduate	42	25.1	73	43.7	52	31.2		
Middle school graduate	15	20	43	57	17	23		
High school and above	30	22.2	52	38.5	53	39.3		
Having children								
Yes	91	24.8	154	43.9	110	31.3	2.266	0.322
No	7	15.6	23	51.1	15	33.3		
Working status								
Yes	1	5.9	9	52.9	7	41.2	3.375	0.185
No	97	25.3	168	43.9	118	30.8		
Monthly income perception								
Income=expense	42	24.1	73	42	59	33.9	1.926	0.749
Income<expense	54	25.2	97	45.3	63	29.5		
Income>expense	2	16.7	7	58.3	3	25		
Smoking status								
Yes	35	23.6	67	45.3	46	31.1	0.487	0.975
No	57	24.6	98	43.8	69	30.6		
Former smoker	6	21.4	12	42.9	10	35.7		
Alcohol use								
Yes	21	17.9	60	51.3	36	30.8	9.112	**0.050**
No	75	28.2	106	39.8	85	32		
Former drinker	2	11.8	11	64.7	4	23.5		
Regular physical activity								
Yes (walking)	21	19.1	53	48.2	36	32.7	4.956	0.292
No	50	29.9	69	41.3	48	28.8		
Sometimes	27	22	55	44.7	41	33.3		
Regular sleep								
Yes	75	24	142	45.5	95	30.5	0.926	0.629
No	23	26.1	35	39.8	30	34.1		
Satisfaction with life								
Not satisfied	13	38.2	15	44.1	6	17.7	12.145	**0.016**
Undecided	21	24.7	46	54.1	18	21.2		
Satisfied	64	22.8	116	41.3	101	35.9		

χ^2: Chi-square.

TABLE 2: The relationship between some health characteristics and frailty (n=400).

	Frail		Pre-frail		No frailty			
Characteristics	**n**	**%**	**n**	**%**	**n**	**%**	χ^2	**p value**
Health perception								
Good/very good	14	7.7	97	53	72	39.3	78.220	**<0.001**
Moderate	64	33.3	76	39.6	52	27.1		
Bad/very bad	20	80	4	16	1	4		
Chronic disease								
Yes	66	26.6	112	45.2	70	28.2	3.222	0.200
No	32	21.1	65	42.8	55	36.2		
Polypharmacy								
Yes (5 and above)	8	18.6	15	34.9	8	18.6	12.948	**0.002**
No	117	32.8	162	45.4	117	32.8		
History of falling in the last year								
Yes	78	22.1	160	45.3	115	32.6	9.566	**0.008**
No	20	42.6	17	36.2	10	21.3		
Hospitalization in the last year								
Yes	21	41.2	18	35.3	12	23.5	8.810	**0.012**
No	77	22.1	159	45.6	113	32.4		
Emergency history in the last year								
Yes	26	38.8	21	31.3	20	29.9	9.803	**0.007**
No	72	21.6	156	46.8	105	31.3		
MNA-SF results								
Normal	32	19.9	69	42.9	60	37.2	5.504	**0.019**
Malnutrition risk	66	27.6	108	45.2	65	27.2		
Katz ADL Scale results								
Independent	92	23.4	177	44.9	125	31.7	18.771	**<0.001**
Semi-dependent	6	100	-	-	-	-		

χ^2: Chi-square; MNA-SF: Mini Nutritional Assessment-Short Form; Katz ADL: Katz Activities of Daily Living.

Accordingly, there was a significant relationship between health perception, polypharmacy, history of falling in the previous year, hospitalization in the last year, emergency history in the last year, MNA-SF results, Katz ADL scale results, and frailty ($p<0.05$).

Significant factors ($p<0.05$) identified in previous analyzes were included in the logistic regression analysis for multivariate analysis. Frailty was the dependent variable in the model (present, n=98; absent: n=302). Accordingly, it was determined that frailty was 4.3 times [95% confidence interval (CI), 2.4-7.7] higher in those aged ≥75 years, 3.1 times (95% CI, 1.4-6.9) in those using 5 or more drugs, 5.7 times (95% CI, 2.9-11.5) in those with a moderate health perception, 30.6 times (95% CI, 8.5-109.6) in those with a bad/very bad health perception, and 2.2 times (95% CI, 0.9-5.0) more in those with a history of falling in the previous year (Table 3).

DISCUSSION

This study showed that 24.5% of the studied older individuals were frail and 44.7% were pre-frail. A study examining frailty in the elderly in Europe reported that 7.7% of the elderly were frail (Switzerland, 3.0%; Portugal, 15.6%) and 42.9% were pre-frail (Austria, 34.0%; Estonia, 52.8%).[17] In a study conducted by Siriwardhana et al. found that 17.4% (95% CI, 14.4%-20.7%; I2=99.2%) of the elderly were frail and 49.3% (95% CI, 46.4%-52.2%; I2=97.5%) were pre-frail.[18] In another study, the frequencies of frailty and pre-frailty were estimated at 43.4 and 150.6 new cases per 1,000 persons, respectively.[19] A study conducted in Türkiye found that 10% of the elderly (14.6% of women and 5.4% of men) were frail and 45.6% were pre-frail.[6] A review of the literature shows worldwide variability in the prevalence of

TABLE 3: Logistic regression analysis of frailty-related risk factors.

Variables	Beta	Wald	p value	OR	95%	CI
Age						
65-74 vs. 75 and older	1.469	24.801	<0.001	4.344	2.437	7.744
Educational level						
Absent vs. present	-0.768	2.134	0.144	0.464	0.166	1.300
Alcohol use						
Yes vs. no	-0.275	0.649	0.421	0.760	0.389	1.483
Polypharmacy						
Yes (5 and more) vs. no	1.157	8.429	**0.004**	3.181	1.456	6.949
Health perception (RC: good/very good)						
Moderate	1.756	24.924	**<0.001**	5.786	2.905	11.527
Bad/very bad	3.422	27.658	**<0.001**	30.637	8.558	109.68
History of falling in the last year						
Yes vs. no	0.807	3.800	**0.050**	2.241	0.996	5.044
Emergency history in the last year						
Yes vs. no	0.583	1.700	0.192	1.791	0.746	4.302
Hospitalization in the last year						
Yes vs. no	0.275	0.303	0.582	1.316	0.495	3.500
MNA-SF results						
Normal vs. malnutrition risk	0.267	0.783	0.376	1.306	0.723	2.358
Katz ADL Scale results						
Independent vs. semi-dependent	20.204	0.000	0.999	-	-	-
Constant	10.8	0.000	0.999	-	-	-

Hosmer and Lemeshow test: 0.640 Nagelkerke R Square: 0.426; OR: Odds ratio; CI: Confidence interval; RC: Reference category; MNA-SF: Mini Nutritional Assessment-Short Form; Katz ADL: Katz Activities of Daily Living.

frailty and pre-frailty. This difference may be due to the difference in the measurement tools or dissimilarities in the demographic or cultural characteristics of the older adults living in different regions. In the literature, it has been emphasized that there may be differences in frailty risk factors among elderly groups in different cultural groups due to cultural differences and personal attitudes towards frailty.

Frailty is considered a preventable or reversible condition when detected in the early stages. Therefore, it is important to better understand the factors that play a role in its progression.[20] In this study, the factors related to frailty were determined. The first factor was related to advanced age. According to the study results, it was observed that people aged ≥75 years were 4.3 times frailer. Similarly, advanced age has been found to be associated with frailty in other studies.[5,6,10,21] Our results were compatible with the literature, and it is expected that vulnerability, and, thus, frailty, of the elderly increases with age.

Polypharmacy is another variable that is associated with frailty. According to the study results, those who used five or more drugs were 3.1 times frail. Other studies have confirmed a relationship between polypharmacy and frailty.[10,21] Because a significant proportion of the elderly people in the sample (10.5%) had 5-11 diseases, it is expected that multiple drug use is noted in the elderly. Furthermore, it should not be ignored that polypharmacy can increase frailty and frailty can increase polypharmacy.[22] Therefore, reducing polypharmacy could be an effective strategy for the prevention or management of this condition.

The study determined that frailty was 5.7 times higher in those with moderate health perception and 30.6 times more in those with bad/very bad health perception. Similarly, Zhao et al. reported that frail elderly individuals have a lower perception of health (odds ratio, 6.26) and the elderly in pre-frailty have approximately twice the perception of health.[23]

Therefore, it is expected that as health problems associated with frailty increase, the elderly's perception of health becomes negative.

Another significant variable associated with frailty in this study was a history of falls in the previous year. According to the study results, frailty was 2.2 times higher in those with a history of falling in the previous year. Studies showing a relationship between falling and frailty support our findings.[6,10,21,24] Frail older adults are likely to experience recurrent falls. With the early detection of frailty, falls, loss of balance, and related accidents, possible sequelae can be prevented, which will indirectly increase quality of life. In addition, scientific evidence has shown that frailty syndrome is a dynamic process that can be reversed with interventions such as physical exercise. As a result of a study physical activity as one of the most effective interventions for frailty.[25]

This study is one of the limited studies examining frailty in the elderly living in the community in Türkiye. For this reason, it is thought that it will contribute to the literature. In addition, the data collection method used in the study is thought to be one of the strengths of this study. However, taking the personal statements of the participants as a basis in data collection and the fact that the study was conducted only in Çanakkale city center are among the limitations of this study. Therefore, the generalizability of the findings is limited. Multicenter studies can be performed with larger samples.

CONCLUSION

In conclusion, the results of this study, which examined the prevalence of frailty and related factors, show that approximately one in every four older people is frail, one in every two older people is pre-frail, and various variables are associated with frailty. The older adults should be screened regularly for frailty in primary healthcare institutions and by nurses who have the opportunity to evaluate the elderly in places where they live outside of health institutions (e.g., home and nursing home) with appropriate screening tools. In addition, nurses should organize health training on physical activity and nutrition, which are associated with frailty. It may be recommended that awareness-raising programs be conducted to stimulate health professionals working in primary care and society to become more sensitive to frailty.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *Fahriye Pala, Melike Yalçın Gürsoy;* ***Design:*** *Melike Yalçın Gürsoy, Fahriye Pala;* ***Control/Supervision:*** *Melike Yalçın Gürsoy, Fahriye Pala;* ***Data Collection and/or Processing:*** *Fahriye Pala, Melike Yalçın Gürsoy;* ***Analysis and/or Interpretation:*** *Fahriye Pala, Melike Yalçın Gürsoy;* ***Literature Review:*** *Fahriye Pala, Melike Yalçın Gürsoy;* ***Writing the Article:*** *Fahriye Pala, Melike Yalçın Gürsoy;* ***Critical Review:*** *Melike Yalçın Gürsoy.*

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